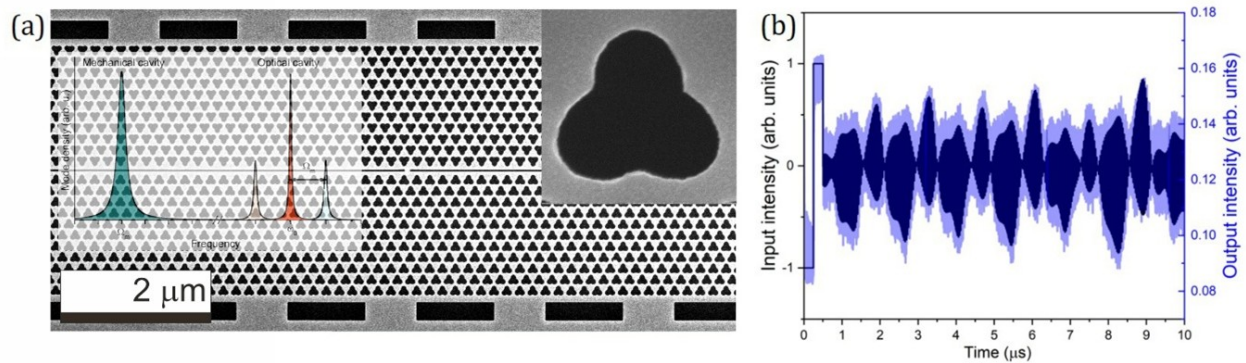


Criticality and Information Processing in Nonlinear Optomechanical Systems

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The project

This experimental PhD will investigate how nonlinear dynamics and critical phenomena in silicon nanophotonic systems can be exploited for information processing. The work will focus on optomechanical cavities operated close to dynamical bifurcations, where light, mechanical motion and fluctuations generate rich dynamics. We aim to understand how memory, nonlinear transformation and computational capability emerge across the transition from stochastic motion to coherent oscillation and more complex dynamical regimes.

Research and training

The PhD will be primarily experimental, focusing on the optical and dynamical characterization of silicon optomechanical systems. The candidate will investigate nonlinear regimes including thermal motion, dynamical bifurcations, phonon lasing and complex dynamics, and will explore their use for physical information processing. Experimental work will be complemented by numerical experiments and modelling to interpret the observed dynamics, guide measurements and connect the underlying physics with computational performance.

Who we are looking for

Candidates with a Master's degree, or equivalent qualification giving access to doctoral studies, in Physics, Photonics, Materials Science, Telecommunications, Engineering or a related field. We are looking for candidates with a strong interest in experimental physics, photonics and nonlinear systems. Previous experience with optics, data analysis or numerical methods is useful but not essential.

Research environment

The PhD will be carried out at ICMM-CSIC in Madrid in an international research environment spanning nanophotonics, optomechanics, complex systems and physical computing, with collaborations with European groups working on silicon photonics, NEMS and complex photonic systems.

Interested candidates: please contact P. David García Fernández · pd.garcia@csic.es · [pdgarfer.github.io](https://github.com/pdgarfer)

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